What Is Claimed Is:

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1. An angle rotator for rotating an input complex number to produce a rotated complex number according to an input angle θ, said angle rotator comprising:

a memory that stores a $\sin \theta_M$ value and a $\cos \theta_M$ value, wherein θ_M is a coarse approximation to said input angle θ;

a first digital circuit that performs a coarse rotation on said input complex number based on said $\sin \theta_M$ value and said $\cos \theta_M$ value, resulting in an intermediate complex number;

a fine adjustment circuit that generates a fine adjustment value based on a θ_L value, wherein $\theta_L = \theta - \theta_M$; and

a second digital circuit that performs a fine rotation on said intermediate complex number based on said fine adjustment value, resulting in the rotated complex number.

2. The angle rotator of claim 1, wherein said fine adjustment value is $(1 - \theta_L^2/2)$.

3. The angle rotator of claim 1, wherein said first digital circuit is a butterfly circuit having a plurality of multipliers that multiply said input complex number by said $\sin \theta_M$ value and said $\cos \theta_M$ value.

4. The angle rotator of claim 1, wherein said second digital circuit is a butterfly circuit having a plurality of multipliers that multiply said intermediate complex number by said fine adjustment value.

5. The angle rotator of claim 1, further comprising an adder that is coupled to said first digital circuit, wherein said adder adds a $\Delta_{\sin\theta M}$ value to said sin θ_M value, and wherein said $\Delta_{\sin\theta M}$ value represents a ROM quantization error for said sin θ_M value.

6. The angle rotator of claim 1, further comprising a second adder that is coupled to said first digital circuit, ~~wherein~~ said second adder adds a $\Delta_{\cos\theta M}$ value to said cos θ_M value, wherein $\Delta_{\cos\theta M}$ represents a ROM quantization error for said cos θ_M value.

7. The angle rotator of claim 1, further comprising an adder that is coupled to said second digital circuit, wherein said adder adds a $\Delta_{\sin\theta L}$ value to said θ_L value, wherein $\Delta_{\sin\theta L}$ represents a ROM quantization error for said sinθ_L value.

8. The angle rotator of claim 1, wherein said ROM is indexed by θ_M.

9. An angle rotator for rotating an input complex number to produce a rotated complex number according to an input angle θ, said angle rotator comprising:

a memory that stores one or more values that are indexed by a most significant word (MSW) of said input angle, including

a first value that is an approximation of a sin θ_M value, and a second value that is an approximation of a cos θ_M value, wherein θ_M is a radian angle that corresponds to said MSW of the input angle, and

one or more error values that represent one or more quantization errors associated with at least one of said first value and said second value;

a first digital circuit that performs a coarse rotation on said input complex number based on said first value and said second value, resulting in an intermediate complex number; and

a second digital circuit that performs a fine rotation on said intermediate complex number based on said one or more error values, resulting in the rotated complex number.

10. The angle rotator of claim 9, wherein said first digital circuit is a butterfly circuit.

11. The angle rotator of claim 10, wherein said butterfly circuit includes a plurality of multipliers that multiply said input complex number by said first value and said second value.

12. The angle rotator of claim 9, wherein said one or more quantization errors reflect a finite memory storage for said first and second values.

13. The angle rotator of claim 9, wherein said first value includes a memory quantization error relative to said sin θ_M value.

14. The angle rotator of claim 9, wherein said first value is an binary n-bit approximation of said sin θ_M value, wherein n is a bit storage capacity for said first value in said memory.

15. The angle rotator of claim 14, wherein said bit storage capacity is N/3 + 1 bits, wherein N is a number of bits that represent a real part of said input complex number.

16. The angle rotator of claim 9, wherein θ_1 is an arcsin of said first value, and wherein said one or more error values include:

a first error value that is a difference between said second value and said cos θ_1.

Sub a1

17. The angle rotator of claim 16, wherein said first error value is represented by $\delta_{[\cos\theta_1]}$ as defined by the following equation:

$$\frac{1}{\sqrt{[\cos\theta_1]^2 + (\sin\theta_1)^2}} = 1 + \delta_{[\cos\theta_1]}.$$

18. The angle rotator of claim 9, wherein θ_1 is an arcsin of said first value, wherein said one or more error values include a second error value that represents $(\theta_M - \theta_m)$, wherein θ_m = arctan ($\sin \theta_1$/ second value).

19. The angle rotator of claim 18, further comprising an adder that adds said second error value to θ_L to produce a θ_l value, wherein θ_L is a radian angle associated with a least significant word (LSW) of said input angle.

20. The angle rotator of claim 19, wherein said angle rotator further comprises a fine adjustment circuit coupled to said second digital circuit, wherein said fine adjustment circuit generates a fine adjustment value based on θ_l and said first error value.

21. The angle rotator of claim 20, wherein said fine adjustment value controls said fine angle rotation in said second digital circuit.

22. The angle rotator of claim 20, wherein said fine adjustment value is approximately: first error value - $(\frac{1}{2}\cdot\theta_l^2)$.

23. The angle rotator of claim 20, wherein said second digital circuit includes a plurality of multipliers.

24. The angle rotator of claim 23, wherein said plurality of multipliers multiply said intermediate complex number by said θ_l value.

25. The angle rotator of claim 23, wherein said plurality of multipliers multiply said intermediate complex number by said fine adjustment value.

26. An angle rotator for rotating an input complex number to produce a rotated complex number according to an input angle, said angle rotator comprising:

a memory that stores one or more values indexed by a most significant word (MSW) of said input angle, including

a first value that is an approximation of a tan θ_M value, and a second value that is an approximation of a cos θ_M value, wherein θ_M is a radian angle that corresponds to said MSW of the input angle, and

one or more error values that represent one or more quantization errors associated with at least one of said first value and said second value;

a first digital circuit that rotates said input complex number based on said tan θ_m value, resulting in an intermediate complex number; and

a second digital circuit that rotates said intermediate complex number so as to produce at least one part of the rotated complex number, based on said one or more error values and said second value, resulting in the rotated complex number.

27. The angle rotator of claim 26, wherein θ_m is an arctan of said first value, wherein said one or more error values include a first error value that represents cos θ_m - second value.

28. The angle rotator of claim 26, wherein θ_m is an arctan of said first value, wherein said one or more error values include a second error value that represents $\theta_M - \theta_m$.

29. The angle rotator of claim 28, further comprising an adder that adds said second error value to θ_L to produce a θ_l value, wherein θ_L is a radian angle associated with a least significant word (LSW) of said input angle.

30. The angle rotator of claim 29, wherein said angle rotator further comprises a fine adjustment circuit coupled to said second digital circuit, wherein said fine adjustment circuit generates a fine adjustment value based on θ_l, said second value, and said first error value.

31. The angle rotator of claim 30, wherein said fine adjustment value controls said fine angle rotation in said second digital circuit.

32. The angle rotator of claim 30, wherein said second digital circuit includes a plurality of multipliers.

33. The angle rotator of claim 32, wherein said plurality of multipliers multiply said intermediate complex number by said θ_l value.

34. The angle rotator of claim 32, wherein said plurality of multipliers multiply said intermediate complex number by said fine adjustment value.

35. In a digital device, a method of rotating an input complex number according to an input angle θ, the method comprising the steps of:

(1) receiving the input complex number;

(2) determining a first value that is an approximation of sin θ_M, and determining a second value that is an approximation of cos θ_M, wherein θ_M is a radian angle that corresponds to a most significant word (MSW) of the input angle θ; and

(3) rotating said input complex number in a complex plane based on said first value and said second value to generate a rotated complex number, whereby said rotated complex number is data processed by said digital device.

36. The method of claim 35, wherein said step of determining comprises the step of retrieving said first value and said second value from a memory.

37. The method of claim 35, wherein θ_1 is an arcsin of said first value, further comprising the step of:

(4) determining a first error value that represents a difference between said second value and cos θ_1.

38. The method of claim 37, further comprising the step of:

(5) rotating said rotated complex number in said complex plane to generate a second rotated complex number based on said first error value.

39. The method of claim 37, further comprising the step of:

(5) determining a second error value that represents $(\theta_M - \theta_m)$, wherein θ_m = arctan (first value/second value).

40. The method of claim 39, further comprising the step of:

(6) adding said second error value to a θ_L value to produce a θ_l value, wherein θ_L is a radian angle associated with a least significant word (LSW) of said input angle θ.

41. The method of claim 40, further comprising the step of:

(7) generating a fine adjustment value based on said θ_l value and said first error value.

42. The method of claim 41, wherein said fine adjustment value is approximately:

$$\text{first error value} - (\tfrac{1}{2}\cdot\theta_l^2).$$

43. The method of claim 41, further comprising the step of:

(8) rotating said rotated complex number according to said fine adjustment value and said θ_l value.

44. The method of claim 43, wherein step (8) comprises the steps of:

(a) multiplying said rotated complex number by said fine adjustment value; and

(b) multiplying said rotated complex number by said θ_l value.

45. In a digital device, a method of rotating an input complex number to produce a rotated complex number according to an input angle θ, the method comprising the steps of:

(1) receiving the input complex number;

(2) determining a first value that is an approximation of sin θ_M, and determining a second value that is an approximation of cos θ_M, wherein θ_M is a radian angle that corresponds to said MSW of the normalized input angle θ;

(3) rotating said input complex number in a complex plane based on said first value and said second value to generate an intermediate complex number;

(4) determining one or more error values that represent one or more quantization errors, including the steps of

Sub a1

(a) determining a first error value that represents a difference between said second value and $\cos \theta_1$, wherein θ_1 is an arcsin of said first value, and

(b) determining a second error value that represents $(\theta_M - \theta_m)$, wherein θ_m = arctan (first value/ second value);

(5) adding said second error value to a θ_L value to produce a θ_l value, wherein θ_L is a radian angle associated with a least significant word (LSW) of said normalized input angle θ;

(6) generating a fine adjustment value based on θ_l and said first error value; and

(7) rotating said intermediate complex number in said complex plane to generate the rotated complex number based on said θ_l value and said fine adjustment value, whereby the rotated complex number is data processed by the digital device.

add a1